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NEWS AND REVIEWS

EDITOR'S NOTE

We hope you like the change in our cover. The Editorial Committee has attempted to improve the appearance of our Journal without detracting from its appeal to our scientific readers. We plan further changes to increase the attractiveness of the articles. We would appreciate your comments regarding this and future changes.

—*John C. Campbell*
ASSOCIATE EDITOR

OUR COVER PICTURE—*This picture of a field of Irish Cobbler potatoes was taken in Aroostook County, Maine, approximately 50 years ago by Dr. Crandall, U.S.D.A., Division of Horticulture. Photo supplied by G. V. C. Houghland.*

POTATO QUALITY IX. USE OF SEQUESTERING AGENTS IN PREVENTING AFTER-COOKING DARKENING IN PRE-PEELED POTATOES.[1]

W. Smith Greig and Ora Smith[2]

In a recent survey, many commercial potato pre-peeling processors listed darkening after boiling as one of their most serious problems. Other surveys, Hotchkiss (3), Spangler (14), have shown that this characteristic greatly affects consumer acceptance.

Review of Literature

This phenomenon of after-cooking darkening has been investigated by many workers and the opinions as to the cause of darkening are conflicting. Variety and climatic and soil conditions are known to influence the amount of discoloration, Wallace (21), Cowie (2), Smith *et al.* (13), Nash (7), Tottingham (17, 18), and Rieman (10). The pigment does not develop in the absence of oxygen, Tinkler (16), Nutting and Pfund (9), Robinson (11), and strong reducing agents are reported to decrease the development of discoloration, Smith *et al.* (13). It appears that the discoloration is not due to melanin, Robinson (11), Nutting (8), but is caused by an iron compound, Tinkler (14), Mader and Mader (5), Nutting (8), Robinson (11), Mulder (6), and Juul (4). Juul (4), after extensive research, has advanced the theory that the ferrous ions of the potato upon cooking combine with an o-dihydric phenol to give a colorless compound which is oxidized upon exposure to air to the strongly colored ferric compound. Several methods are known to prevent after-cooking darkening, however, most methods are not adaptable for use by commercial pre-peelers. The pigment will not develop when the potatoes are cooked in solutions acidified by addition of hydrochloric, citric, acetic, and other acids, Tinkler (16), Robinson (11), Smith *et al.* (13), Nutting and Pfund (9). However, with the use of acids in the cooking water, a thin, tough layer is formed on the outside of the potato. "Even though the tuber might not taste noticeably sour it is rendered quite unpalatable by the tough layer. When the quantity of acid is increased, blackening is decreased but the thickness of the objectional layer is more pronounced", Nutting (8). In tests of phytic and acetic acids, it was found that using them as a dip, as would be used by pre-peelers, of high enough concentrations to prevent darkening after cooking, resulted in excess "leakage" in storage as well as the formation of a tough unpalatable layer upon boiling. Storage of the unpeeled potatoes at a temperature of 100 degrees F. for three days reduced the amount of after-cooking darkening, Smith *et al.* (13), however, this method is impracticable because it is too close to the point of anaerobic respiration and the resulting black heart. The addition of a small amount of sodium acid pyrophosphate to the cooking water will prevent darkening, Juul (4), apparently without the disadvantage of changes in texture. It has been noted by the authors that the texture, *i.e.*,

[1]Accepted for publication June 4, 1954.
Paper No. 379, Department of Vegetable Crops, Cornell University.
[2]Graduate Assistant and Professor, respectively, Department of Vegetable Crops, Cornell University, Ithaca, N. Y.

the mealiness, actually seems to be improved with the use of sodium acid pyrophosphate in the cooking water. As a dip , the sodium acid pyrophosphate would ameliorate but would not completely prevent darkening after a one minute dip in concentrations as high as five per cent.

Experiments with Sequestering Agents

Many cooking tests have been conducted with the sequestering agents and the two experiments presented here show typical results. By definition, *Tetrine* (15), a sequestering agent is any compound that will inactivate a metallic ion by forming a water soluble complex in which the metal is held in a non-ionizable form. The sequestering agents used in these experiments were the di sodium and tetra sodium salts of ethylenediamine tetraacetic acid. These salts are white, non-hygroscopic crystalline powders, in aqueous solution they are clear, colorless liquids.

The potatoes were of Katahdin variety obtained from a commercial pre-peeler who had been experiencing serious after-cooking darkening from this particular source of raw stock. In each test, at least four tubers varying in size from 2¼ to 3¼ inches in diameter were peeled thinly by hand, and then washed in running water. As after-cooking darkening is normally more evident in the stem end, Tottingham (17), Nutting and Pfund (9), Wager (20), each tuber was quartered at the stem end and alternate quarters were used as a check against the effectiveness of different treatments. In the second experiment, only one quarter was used as a check. The chemical treatments were at approximately 70 degrees F. and the potatoes were dipped for 60 seconds, drained for about one minute, packaged in polyethylene bags, heat sealed and stored at 50 degrees F. for 24 hours before the cooking tests were commenced. The pH of the treatment solutions was determined by use of a Beckman pH meter. The samples were cooked until done in pyrex glass beakers containing 500 cc of water, drained and then allowed to cool for 30 minutes before organoleptic values of the degree of darkening were noted. Values varying from 9, for perfectly white, to 1, for extremely severe darkening over the whole tuber were assigned to each quarter of the tubers. Only those tubers with a rating of 8, a slight trace of after-cooking darkening, or a rating of 9, perfectly white, were considered as commercial control of after-cooking darkening. Values below a rating of 3 probably would not occur naturally but may be induced by the addition of iron compounds to the tubers.

The "checks" in table 1 were treated with a 1.5 per cent solution of sodium bisulfite ($NaHSO_3$) which had a pH of 5.7. The "Sequestering Agent (Na_2)" consisted of a mixture of 1 per cent di sodium salt of ethylenediamine tetraacetic acid plus 1 per cent $NaHSO_3$; this mixture had a pH of 5.9. The "Sequestering Agent (Na_4)" was a mixture of 1 per cent tetra sodium salt of ethylenediamine tetraacetic acid and 1 per cent $NaHSO_3$, with a pH of 6.3.

Since a one minute dip in a one per cent solution of the sequestering agents gave good control, other tests were conducted to see if the concentration could be lowered. The results of the effects of different concentrations on after-cooking darkening are given in table 2. In this experiment, the same source of raw stock and the same methods were employed as listed previously.

TABLE 1.—*Effect of 1 per cent solution of sequestering agent on after-cooking darkening of boiled potatoes.*

Time of Cooking (Days after Treatment)	Tuber Number	Color Ratings*			
		Check	Sequestering Agent (Na_2)	Check	Sequestering Agent (Na_4)
1	1	4	9	4	8
	2	5	9	5	9
	3	7	9	7	9
	4	8	9	9	9
3	5	4	9	4	9
	6	6	9	5	9
	7	6	9	7	9
	8	8	9	9	9
5	9	3	9	3	9
	10	5	9	4	9
	11	7	9	7	9
	12	8	9	8	9
7	13	4	9	4	8
	14	6	9	6	9
	15	6	9	6	9
	16	7	9	7	9
Averages		5.9	9.0	5.9	8.9

*From 9, white, to 1, black.

In table 2, the "Check" was treated with a 1.5 per cent solution of $NaHSO_3$ and the other treatments were mixtures of 1 per cent $NaHSO_3$ and the concentrations indicated of the tetra sodium salt of ethylenediamine tetraacetic acid. Again all the treatments were of 60 seconds duration at approximately 70 degrees F.

DISCUSSION

From the first table it is seen that a 1 per cent solution of either the di sodium or tetra sodium salt of ethylenediamine tetraacetic acid completely prevented after-cooking darkening whereas the checks (quarters of the same tubers) darkened quite severely. The differences were striking. It was possible to fit the four quarters of the tubers back together and the portions of the tubers treated with sodium bisulfite and the sequestering agents were consistently white, with no trace of darkening. In table 2, although the checks showed only moderate darkening, the sequestering agents showed some effect at 0.25 per cent concentration, 0.50 per cent was more effective, and in this case 0.75 per cent controlled the after-cooking darkening. The effect of preventing after cooking darkening is not due to the acidity of the solutions as the pH of the test solutions were higher than those of the check treatment.

TABLE 2.—*Effect of different concentrations of sequestering agent on after-cooking darkening of boiled potatoes.*

Time of Cooking (Days after Treatment)	Tuber Number	Color Ratings*			
		Check	Concentration of Sequestering Agent		
			0.25 Per cent	0.50 Per cent	0.75 Per cent
2	1	7	7	8	9
	2	7	7	9	9
	3	7	8	9	9
	4	8	9	9	9
4	5	6	8	8	9
	6	7	8	9	9
	7	8	9	9	9
	8	8	9	9	9
6	9	7	8	8	9
	10	8	8	9	9
	11	8	8	9	9
	12	9	9	9	9
8	13	7	7	8	9
	14	8	8	9	9
	15	9	9	9	9
	16	9	9	9	9
Averages		7.2	8.2	8.6	9.0

*From 9, white, to 1, black.

These data are compatible with the theories that after-cooking darkening is the result of the ferrous ions of the potato being changed upon cooking and exposure to air to the strongly colored ferric ions. Evidently the effectiveness of the sequestering agents is in the inactivation of the iron or iron and other metallic ions by forming a water soluble complex in which the metal or metals are held in a non-ionizable form and therefore preventing the after-cooking darkening.

OTHER EFFECTS OF SEQUESTERING AGENTS

Experiments with sequestering agents indicate that the storage life of the peeled potatoes may be increased by 2 to 5 days at temperatures of approximately 50 degrees F. The use of the sequestering agents by themselves did not prevent the darkening or discoloration of the peeled raw product, but when used in conjunction with sodium bisulfite they increased the storage life considerably compared with that of potatoes treated with sodium bisulfite alone. Clark (1) has shown that the tetra sodium salt of ethylenediamine tetraacetic acid has some inhibiting effect on darkening of beets during processing operations. The effectiveness of adding the sequestering agents to the new peeled potatoes appears to be two-fold; that of inactivating metallic ions which are involved in discoloration and at the same time acting as a mold inhibitor.

After-cooking darkening was not inhibited if the potatoes were boiled immediately after a 60 second dip in a one per cent solution of the sequestering agent; however, the experiments presented here indicate that the darkening is effectively inhibited 24 hours after treatment. The specific time lag necessary after treatment before the after-cooking darkening is effectively inhibited has not yet been determined.

A slight "rind" or layer was formed on the potatoes when boiled but there was no noticeable difference between those treated with mixtures of sequestering agents and sodium bisulfite and those treated with sodium bisulfite alone.

Although no taste panels, as such, were conducted, apparently the sequestering agents used in these experiments did not impart any odor or off-flavor to the potatoes.

Although toxicity studies have been conducted, *Versene* (19), *Tetrine* (15), *Sequestrene* (12), which show these compounds to be relatively non-toxic in low concentrations, it is suggested that processors interested in their use discuss their problems with the Food and Drug Administration.

Summary

A 60 second dip in a mixture of 1 per cent sodium bisulfite and 1 per cent sequestering agent (the di sodium or tetra sodium salt of ethylenediamine tetraacetic acid) effectively prevented after-cooking darkening of pre-peeled potatoes when there was a time lag of 24 hours or more between time of treatment and time of cooking.

The prevention of after-cooking darkening by the use of sequestering agents is compatible with most recent theories as to the cause of darkening. Evidently the effectiveness of the sequestering agents is in the inactivation of the iron or iron and other metallic ions by forming a water soluable complex in which the metal or metals are held in a non-ionizable form which therefore prevents their oxidation after cooking and the resulting discoloration.

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POLLEN AND POLLINATION STUDIES ON IRISH POTATOES[1,2]

J. R. KING[3]

The purpose of this preliminary report is to bring to the attention of Irish potato breeders a method of pollination, and of handling pollen for pollination purposes, which is particularly well suited to Irish potato breeding.[4] The method is rapid and gives the potato breeder greater control over some of the variables in the handling of pollen for pollination. It covers several steps, each of which is convenient to carry out.

Collection of Flowers—Flowers which are to supply pollen in a planned cross should be gathered during the day prior to the intended pollinations. The inflorescences may be picked at any time during the day; but it is important that only newly opened flowers or buds which will soon open, should be collected.[5] A sufficient number of flowers for any one batch of pollen can be collected in a few minutes, since, thirty to forty flowers will furnish enough pollen for a large number of pollinations. Flowers can be collected in paper bags, and collections from a number of varieties or selections can be made in a short time.

Securing the Pollen—Stamens should be separated out soon after collecting the flowers; however, there is no harm in a delay of a few hours or longer, especially if the flowers can be kept cool (as in a household refrigerator).[6] The stamens are separated from the flower by a cut across the base of the anthers (preferably, with dissecting scissors). Only a few minutes are required for the cutting out of enough anthers for any one batch of pollen. A large number of anthers are needed, however, for a selection or variety (like Sebago) which produces a small amount of pollen per anther. The stamens are cut over a Petri dish (Figures 1 and 2A); and for proper drying, no more anthers should be cut into one dish than will cover the bottom. The identity of the material is written with a wax pencil on the underside of the dish. The cutting of stamens from a flower necessitates also, of course, the cutting out of the pistil. The danger of contamination from foreign pollen in a batch of anthers

[1]Accepted for publication June 21, 1954.
Appreciation is expressed to Dr. J. C. Miller, Head, Horticultural Research Department, Louisiana State University, for the suggestion of this report and for his continued interest in the work upon which the report is based.

[2]Photographs were taken by P. L. Hawthorne, Associate Horticulturist, Horticultural Research Department, Louisiana State University, Baton Rouge, La.

[3]Associate Horticulturist, Department of Horticultural Research, Louisiana State University, Baton Rouge, La.

[4]Essentially the same pollination technique described in this paper has been known for a long time to tree fruit breeders, particularly on the West Coast, where the writer became acquainted with its use in the Department of Pomology, University of California, at Davis. As outlined here, however, adaptations have been made which are specific for Irish potato breeding.

[5]When the flowering season of fall seed-grown La Soda plants was past its peak, buds which were ready to open yielded more abundant and more viable pollen than did the open flowers. This condition may be found to exist in all potato varieties, but only La Soda has thus far been checked. The condition exists in certain other horticultural plants.

[6]The rapid collection of pure potato pollen with mechanical pollen collectors has been successful elsewhere. They have not yet been used in the work reported in this paper.

is negligible when the material consists of flowers freshly opened or of buds nearly ready to open. The examination of pistils in batches of cut anthers, and of pistils of newly opened flowers or buds about to open, has revealed either no pollen on the pistils or, at most, only a few grains. The pistils, however, can be removed with forceps within a few minutes.

Pollen is released from the anthers and made readily available for pollination after the anthers are dry. The latter will dry in eight to twelve hours in a warm room; however, they will dry more thoroughly when the Petri dish is placed for three to six hours over low (95°-100° F.) heat, followed by an additional six to ten hours at room temperature only.[7] It is convenient in the laboratory for the dishes to be set on top of a dry heat oven, with the heat from the oven cut down to proper intensity by layers of paper towels. A slide warming table is also satisfactory for this purpose. Anthers dried over gentle oven heat during the late afternoon, or during a few hours after evening dinner, then left overnight at ordinary room temperature, will be found ready for pollination early the following morning (Figure 2B).

The anthers of Irish potato flowers sometimes adhere slightly to the bottom of a Petri dish after an hour or so of heating. This condition is remedied by redistributing them with a spatula, scalpel or knife blade. This needs to be done only once during the drying process. The anthers will show shriveling and drying within a few hours; and those from any variety or selection which is a good pollen producer (such as Katahdin, Cherokee, De Soto and fall-grown La Soda) will release pollen over the bottom of the dish (Figure 2C).

When a batch of anthers is dry, the anthers are poured into a vial (15 x 45mm or of similar size), which is labeled with the pollen's identity and the current date (Figure 3B). Vials of pollen should be left open when not actually being used in pollination—particularly when they are in storage. A loose plug of cotton is convenient for vials which are being handled. Pure pollen can quickly and easily be collected when a batch of dried anthers is shaken or agitated in any manner. The large scale use of any one kind of pollen will require the pollen to be available in this form.

Pollination—There are several ways by which pollination can be carried out on a planned cross. The one recommended here, which is convenient, easy, and rapid, is as follows: The vial, with a tightly fitting cork,[8] is shaken vigorously; and the pollen is applied to the stigma with the cork, preferably by a slanting stroke (Figures 4 & 5). Corks can be used again after their pollen covered surfaces have been wiped with alcohol and allowed to dry.[9]

When flowers are emasculated prior to pollination, and two or more persons are working together, one person applying pollen can easily keep

[7]Proper heat for drying pure pollen will probably be found to be lower than 95°F.

[8]Number 4 cork is best for a 15 x 45mm vial. (See Figure 33). Its base should be smooth, so that there will be a maximum surface on which the pollen may accumulate when the vial is shaken.

[9]An artists brush can be used instead of a cork; however, its use is recommended only when an abundance of pure pollen is available for each cross.

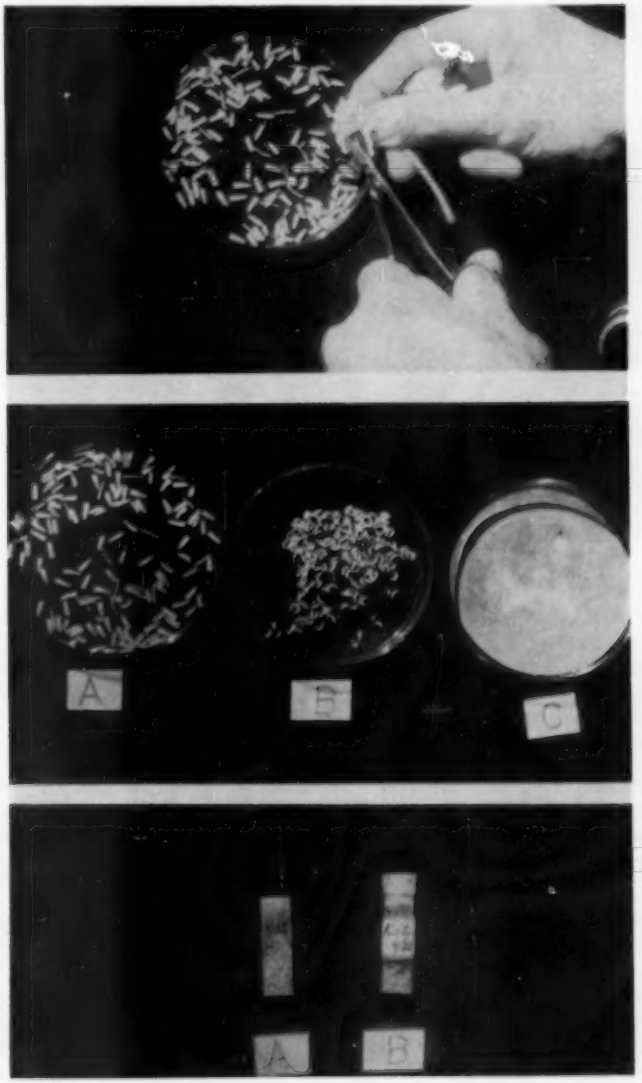

FIGURE 1.—(Top)—Cutting stamens into a Petri dish.

FIGURE 2.—(Center)—A. Freshly cut anthers before being dried.
B. Dried anthers ready for use in pollination.
C. Pollen released in Petri dish from dried anthers before the anthers are transferred to a vial.

FIGURE 3.—(Bottom)—A. Showing pollen collected on the sides of a vial when the latter was shaken. B. Vial of dried anthers ready for pollination (labeled and stoppered).

abreast of several or more persons who are emasculating the blossoms. The number of flowers emasculated in an hour by one person can be pollinated in a fraction of that time.

Checking the Viability of the Pollen— The viability of each batch of pollen which is ready for pollination can be checked as a matter of record. If the same batch is to be used for more than one day's pollination, its longevity can be re-determined whenever desired.

The most satisfactory medium for germinating potato pollen found thus far during the studies reported in this paper is 2 per cent shredded agar[10]—13.5 per cent sucrose; however, a better medium may be found in the future. The pH of this medium was found to be 5.6 to 5.7. A change of pH in either direction seemed to have little effect on pollen germination.

Pollen is conveniently cultured by the vial of anthers being shaken, and the cork stopper then being dropped lightly on the culture medium. The pollen will spread on the medium when the Petri dish is hit firmly on the table top (Figure 6). The cork can be used again after its pollen-covered surface has been thoroughly wiped with alcohol, then dried. Pollen can also be sown on the culture medium with a dissecting needle or by using a finger in place of a cork when a vial is shaken. A count of one hundred grains in each of at least two locations in a culture will give an estimate of pollen viability. Hand counters are convenient for recording the counts.

Short Period Storage of Pollen—When pollen is not to be used soon after the anthers have been dried, a temperature of 35° to 40° F. is suggested for storage of the anthers. This short period storage environment is also suggested for pollen which has already been used for pollination and is to be used again within a few days.

The keeping of pollination records, tagging of pollinations, the collection and handling of seed balls, and similar operations vary according to the practices of individual potato breeders. They are outside the scope of this report, since the pollination method outlined above is in no way affected by differences in the ways they are carried out.

General Remarks—It is hoped that other workers will try the pollination method outlined here and will contribute, through their own experience with the handling of pollens, to a stockpile of needed information on the pollens of Irish potato varieties. During its first year of trial on Irish Potatoes, the method was highly successful—not only at Baton Rouge but also at one other southern station. It has not been tried elsewhere, so far as we know.

One season of experience with the use of this method in Louisiana, however, has allowed for the accumulation of a limited amount of basic information which is extensive enough only to serve as a background for continued inquiry into many problems on Irish potato pollens and pollination (Table 1).

[10]Shredded agar gave considerably better results in the pollen germination tests reported here than other grades of agar.

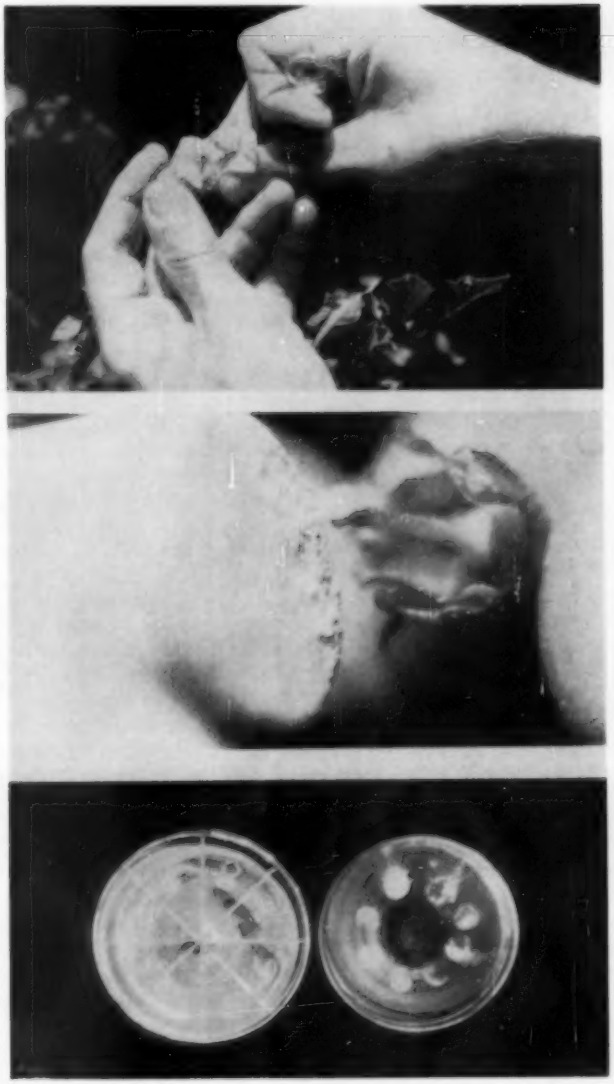

FIGURE 4.—(Top)—Pollination. (Note that the vial of pollen is held ready for re-shaking when more pollen is needed on the cork).

FIGURE 5.—(Center)—Close-up view of the cork and stigma of the flower shown in figure 4 as being pollinated. Note the abundance of pollen on both stigma and cork.

FIGURE 6.—(Bottom)—Pollen cultures. The eight cultures shown in the left dish are identified by the markings on the top dish, shown at the left. Of course, a key to the numbers is necessary.

TABLE 1.—*Crosses made during the 1954 spring pollination season at Louisiana State University.*[1]

Cross	Per cent Set	Age of Pollen	Quantity of Pollen Produced by Anthers
Red La Soda X L92-23	9.5[4]	2-3 days[4]	Large
La Soda X L12-92	38.5[2]	1-2 days[2]	Large
La Soda X L92-23	30.0[3]	0-4 days[3]	Large
Katahdin X Cherokee	3.5	2 days	Large
Triumph X USDA 1859	20.0	fresh[8]	Large
Triumph X L92-23	22.5	fresh[8]	Large
Triumph X L12-69	9.0	fresh[8]	Large
Cherokee X De Soto	3.0	3 days	Large
Cherokee X Katahdin	10.0	1 day	Large
Cherokee X L12-69	12.0	1 day	Large
Sebago X Katahdin	6.0	3 days	Medium
Sebago X Neb. 26.44-1	13.3	3 days	Large
Sheridan X L92-23	28.0	5 days	Large
L82-269 X L92-23	2.2	1 day	Large
L92-23 X Katahdin	3.3	fresh[8]	Medium
L92-23 X L92-167	8.0	2 days	Large
L92-167 X L92-23	33.0[5]	1-5 days[5]	Large
L92-167 X L12-92	11.1	2 days	Large
L92-167 X La Soda	66.6	1 day	Large
L91-258 X Cherokee	10.0	2 days	
L12-6 X L92-23	80.3[6]	fresh[8] to 1 day[6]	Large
L12-51 X USDA 1859	5.5	2 days	Large
L12-69 X L12-92	46.0	2 days	Large
L12-69 X USDA 1859	17.1	2 days	Large
USDA 1859 X Neb. 26.44-1	1.1	2 days	Medium
USDA 606-37 X La Soda[7]	50.0	1 day	Large

[1]Table 1 includes only those crosses involving known varieties and the most promising seedlings. It does not indicate all successful combinations made during the season, nor the fact that repeated pollinations among certain combinations resulted in no set, particularly when certain selections were used as the female parent. These pollinations, which were made early in the studies and reported in this paper, do not indicate the apparent long-period viability (in storage) of potato pollens, which is now becoming evident as a result of more recent tests.

[2]An average of two separate days of pollinations, using pollen that was 1 day and 2 days old,respectively.

[3]An average of three separate days of pollinations, using pollen that was 4 days old, fresh, and 2 days old, respectively.

[4]An average of two separate days of pollination, using pollen that was 2 and 3 days old, respectively.

[5]An average of three separate days of pollinations, using pollen that was 1 day old for the first two pollinations, and 5 days old for the third group. The latter, incidentally, set 28.2 per cent.

[6]An average of two separate days of pollinations, using pollen that was 1 day old for one group of pollinations and a fresh lot of pollen for the second group.

[7]Plants of La Soda from fall-grown seed produced a large amount of viable pollen per anther, which was used in this cross; but those from spring-grown seed produced very little.

[8]The designation "fresh" is here applied to distinguish pollen which was used in pollinations immediately after the anthers were dry.

There is, for example, still a question regarding the best time, or times, during the day when pollinations should be made. Limited tests have indicated, thus far, that the daily weather and the compatibility of the parents used in pollinations are more to be reckoned with than is the hour of the day when the pollinations are made—at least so it seems for Baton Rouge.

Viability and longevity are two important potato pollen characteristics which, like other varietal characteristics, will become better known and understood in the course of the accumulation of data.

The value of germination tests (using artificial media) in the determination of the degree of potency of fresh pollen for immediate pollination purposes is questioned by some people, including myself; nevertheless, the tests are very helpful in determining whether or not any particular pollen is viable. The proof, of course, of any pollen's potency rests with the results from its use in field pollinations. There is, furthermore, occasionally no close agreement between the germination percentage of a particular fresh pollen and its apparent potency in breeding. This is to be expected. Germination tests of fresh potato pollens on artificial media should be considered as giving only an indication of viability; and the percentage of germination (which thus far has been found to range between five per cent and sixteen per cent for nearly all pollens cultured) should not necessarily be considered as the apparent total viability of any batch of pollen. When these tests are used, the germination potential of pollen on a stigmatic surface should be estimated on the basis of both the percentage of germination on the artificial medium and the percentage of remaining healthy-appearing grains in the culture. Many of the latter (which are the grains that stain darkly when certain stains are used) will indicate their activeness by bursting in culture. These ungerminated, but healthy looking, grains are readily distinguishable from the colorless, empty, and often distorted, lifeless grains.

The greatest value in germination tests lies in their use on stored pollen—that is, on the checking of the viability (if there remains any) of pollens which have been used once in pollinations and are intended to be used again, or of pollens which were prepared for immediate use in pollinations but the use of which had to be postponed. The breeder's interest in stored pollen is whether or not the pollen is still viable enough for use in pollination, and also on how much viability the pollen has lost, if any, since it was collected.

A rapid and reliable viability check of fresh pollen will, no doubt, be devised before long; even in view of methods employing the use of stains, such as acetocarmine and 2, 3, 5-triphenol tetrazolium chloride, which only help to show more clearly that which is already obvious. Any such test should (in order to be practical for pollination purposes) be able to show a close enough agreement between a pollen's viability rating in a laboratory check and its potency in the field.

A future possible application of potato pollen storage from season to season can be illustrated in the La Soda variety. Plants grown in Louisiana from spring seed produced few flowers and the pollen from these flowers was too inactive for use during the 1954 spring pollinations. La Soda plants grown from fall seed, however, flowered profusely, but were too late in the season for the pollen to be used in many desirable

crosses. Pollen from the fall seed grown plants, furthermore, was found to have as high a germination percentage as any pollen tested (16 per cent).

There are many problems to be worked out relative to the most effective and efficient handling and use of pollen for pollination purposes in Irish potato breeding, but the ever-increasing knowledge on pollens should be considered from the standpoint of its importance in breeding techniques.

The practicality of exchanges of viable pollen among potato breeders throughout the world and the establishment of so-called "pollen banks" should be only a matter of time.

Preliminary tests on shipment by air of viable potato pollens indicate that such shipments will not present a serious challenge, particularly as the response of individual pollens to storage and handling is better understood.[11]

[11]La Soda pollen nearly ten weeks old was shipped in July, 1954, *via* Air Parcel Post from Baton Rouge to Minnesota where in limited pollinations on three varieties and selections, the overall average set of seed balls was 37 per cent. The higher two sets were 66 and 33 per cent, respectively, whereas the lowest was 14. A report on the number of seeds developed in the seed balls has not yet been received. Appreciation is expressed to the University of Minnesota Potato Breeding Farm, at Two Harbors, for their cooperation.

A STUDY OF THE OXYGEN-PERIDERM RELATIONSHIP IN POTATO TUBERS AND THE EFFECT OF OXYGEN ON THE NORMAL BREAKING OF THE REST PERIOD[1]

RICHARD L. SAWYER AND ORA SMITH[2]

Since Appleman in 1914 found an increased oxygen absorption was correlated with treatments which abbreviate the rest period, several workers, some of whom have been widely quoted, have tried to explain the rest period phenomenon in tubers as the result of oxygen permeability of the periderm. There has been a diversity of opinion as to just how oxygen affects the rest period or if oxygen *per se* has any effect on the rest period. The same results have been used in some cases for opposite conclusions. This investigation was conducted to clear up some of these opposing theories and conclusions and possibly give a clearer understanding of the rest period phenomenon.

Appleman (1) suggested that the rest period of the potato depended on the resistance of the periderm to the entrance of oxygen. Under normal conditions the skin becomes suberized before the completion of some growth mechanism requiring oxygen. When a proper adjustment had been made between the bud tissue and external agents, chiefly oxygen, Appleman believed the rest period would be broken. Thornton (7), (8) also explains the normal breaking of the rest period in terms of the permeability of the periderm to oxygen. However, he believed the internal oxygen supply is limited by the periderm as the tuber becomes older in storage with new layers of cells developing and the cell walls becoming thicker. Gradually the internal oxygen is limited to such an extent that the rest period is broken. Emilsson (4) found no relation between the thickness of the periderm and length of the rest period. Burton (2) indicated that the flesh of the tuber offered no serious resistance to slow oxygen diffusion and concluded that oxygen concentration *per se* plays no part in the onset and termination of the rest period under ordinary conditions.

MATERIALS AND METHODS

Controlled Atmosphere Experiments

Experiments using 17 liter glass jars were conducted at temperatures of 85°F, 64°F. and 50°F. Several varieties were used at each temperature. Oxygen-nitrogen mixtures of 2, 5, 10, 20 and 60 per cent oxygen were used in each experiment. A check treatment was used consisting of tubers kept in a jar with the cover left off to see if tubers in this jar were sprouting at the same time as tubers in the 20 per cent oxygen jars. This was necessary to make sure that respiration products were being eliminated in a satisfactory manner and were not influencing the rest period. The gas mixtures were changed completely every other day in all but one experiment, by flushing the jars with a similar mixture. These mixtures were made by passing gas from an oxygen tank and gas from a nitrogen tank containing pressure regulators into a T and then into a sample bottle. When the gas in the sample bottle was adjusted to the desired proportions, all jars containing this mixture were flushed. Gas mixtures were checked frequently with the Fyrite oxygen and carbon dioxide meters and the Beckman oxygen meter.

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Paper No. 377, Department of Vegetable Crops, Cornell University.
[2]Cornell University, Ithaca, N. Y.

Freshly harvested material was used in all of these experiments. Tubers for any given experiment came from the same source. Whenever several varieties were used in the same experiment, the tubers came from a variety trial or from check treatments in an experiment where several varieties were used. Readings were taken every other day to determine when the rest period was broken. When any bud on a tuber had enlarged to be noticeable to the eye, the rest period was considered broken. The number of tubers included in each jar ranged from four in one experiment to a maximum of 10 in another. Each treatment was replicated from three to five times in the different experiments. Tubers per treatment total in the experiments ranged from 16 to 40.

Diffusion Experiments

Tuber discs two millimeters thick and twelve millimeters in diameter were used. Cylinders were punched from tubers with a sharp cork borer and then the periderm end of the cylinder was placed against the end plate of a cutting board. A firm sharp blade was then rotated through the cylinder two millimeters from the periderm end. In the carbon dioxide diffusion studies the tubers discs were sealed with a vaseline-wax mixture into test tubes containing .01 normal sodium hydroxide and phenolphthalein indicator. The tubers were placed in a 100 per cent carbon dioxide chamber for one hour. Carbon dioxide gas was bubbled through water in the chamber continuously to keep the humidity as high as possible and to prevent the discs from drying out. At the end of an hour the contents of the test tubes were titrated with .01 normal sulphuric acid after a thorough shaking of the contents to make sure all the carbon dioxide in the air of the tuber had gone into solution.

In the oxygen diffusion studies the same size test tubes as used in the carbon dioxide experiments were fused into 125 cc. flasks after removing the bottoms from the tubes. Discs were sealed into the test tube openings with the vaseline-wax mixture. Through glass tube outlets the flasks were flushed with nitrogen gas and then sealed. Each flask was checked at the end of the flushing with a Beckman oxygen meter to make sure all atmospheric oxygen had been removed. The sealed flasks were left in a normal atmosphere for one hour then the gas in the flask was forced through the Beckman oxygen meter by water displacement to determine how much oxygen had entered through the discs. All oxygen readings were made after the gas saample had been passed through a tube of silica gel to remove moisture.

Peeling Experiments

Tubers with several periderm treatments were placed in peach baskets and stored in the dark at a temperature ranging from 60° to 68°F. and a relative humidity ranging from fifty to sixty per cent. Two experiments were conducted using tubers which had terminated their rest period.

Abbreviations for the treatments used in the peeling experiment will be used in the remainder of this paper. These abbreviations have the following meaning:

"normal"—tubers with their periderm left in its normal position.

"moist"—tubers with the periderm left in its normal condition and packed in moist sphagnum moss.

"peeled thin"—tubers with the normal periderm removed by one thin peeling.

"peeled thick"—tubers with the normal periderm removed by one thick peeling.

"peeled x times"—tubers with the normal periderm removed by one thin peeling at the beginning of the experiment and an additional thin peeling made every other day until a total of four or five peelings had been made.

In any case where peeling was part of the treatment, the tubers were peeled as close to the eyes as possible without injury to the buds. Uniform tubers approximately six to eight ounces in weight were used.

Results

Controlled Atmosphere Experiments

There were no statistically significant differences in dormancy among any of the oxygen-nitrogen mixtures at 85°F. There were no differences among treatments at 64°F in one experiment, however, in another experiment tubers in the five and ten per cent oxygen mixtures sprouted earlier than tubers in the higher oxygen concentrations. At 50°F tubers tended to sprout earlier in the lower oxygen concentrations. Tables 1 and 2 give the results from one experiment at 50°F and one experiment at 64°F, respectively. Wherever there were significant differences among treatments, these differences were for a very few days, generally less than a week. There were no significant differences among replications in any of these experiments.

TABLE 1.—*Days to sprouting of tubers stored in several mixtures of oxygen and nitrogen gas at 50° F.*

Per cent Oxygen	Average Days to Sprouting
2	30.7
5	30.7
10	31.0
20	33.0
60	33.8
Check (air)	33.0
L. S. D. at 0.05 level	2.0
L. S. D. at 0.01 level	2.8

Diffusion Experiment

Table 3 shows the results of a diffusion experiment using normal periderm, wound periderm and a check treatment which was normal periderm with the periderm scraped in several places. This check treatment was considered necessary to see if the differences in disc diffusion rates were due to periderm diffusion differences. The wound periderm tubers and the normal periderm tubers had been left at a temperature of 64° F and a relative humidity of 50 per cent until a good suberized layer had built up on the peeled tubers. Discs from the tubers in the check treatment

TABLE 2.—*Days to sprouting of Bliss Triumph tubers stored in several mixtures of oxygen and nitrogen gas at 64° F.*

Per cent Oxygen	Average Days to Sprouting
2	15
5	12
10	12
20	17
60	18
Check (air)	19
L. S. D. at 0.05 level	4.6
L. S. D. at 0.01 level	6.2

TABLE 3.—*Carbon dioxide diffusion through tuber discs from normal periderm, wound periderm, and punctured normal periderm.*

Treatment	Average Milligrams of Carbon Dioxide per Square Centimeter of Discs per Hour
Normal periderm discs	.80
Wound periderm discs	1.80
Punctured normal periderm discs	2.61
L. S. D. at 0.05 level	.33
L. S. D. at 0.01 level	.45

showed the highest rate of diffusion and the wounded periderm revealed a faster rate than the normal. There were 19 tubers used in each treatment with four disc readings made per tuber. This made 76 disc readings for each treatment.

There was considerable variability between discs on a given tuber with normal periderm. Believing that this might be due to differences in lenticels included in the discs, table 4 gives the results of an experiment set up to find out the effect of lenticel number and size, and type of storage on gas diffusion through the normal periderm. Discs were taken from tuber areas with many large lenticels and few small lenticels from both dry and moist storage. The discs with many lenticels had a faster rate of gas diffusion than those with few lenticels. Those discs from moist-stored tubers produced a faster rate of gas diffusion than the discs from dry-stored tubers. Both of these differences were significant at the one per cent level. Thirty one disc readings were made for each of the four treatments.

TABLE 4.—*Carbon dioxide diffusion through discs from areas having many and few lenticels on both moist and dry stored tubers.*

Treatment	Average Milligrams of Carbon Dioxide per Square Centimeter of Disc Area per Hour
Moist stored—few lenticels	2.4
Moist stored—many lenticels	4.1
Dry stored—few lenticels	1.5
Dry stored—many lenticels	1.7

Table 5 gives the results of a diffusion experiment using both oxygen and carbon dioxide with tubers on which sprouting records had been kept. The rate of gas diffusion was greater through wound periderm discs with both carbon dioxide and oxygen than through normal periderm discs. These readings were taken after a majority of the tubers had started sprouting. The wound periderm tubers sprouted earlier than the normal periderm tubers with the difference being highly significant.

TABLE 5.—*Oxygen diffusion through tuber discs from normal periderm and wound periderm.*

Treatment	Average Milligrams per Square Centimeter of Disc Area per Hour	
	Oxygen	Carbon dioxide
Normal periderm	6.07	.85
Wound periderm	7.16	1.07
T = 3.41 for oxygen	Greater than 0.01 significance	
T = 11.6 for carbon dioxide	Greater than 0.01 significance	

Peeling Experiments

In the first peeling experiment using Cobbler, Kennebec, Katahdin and Sebago varieties with the four periderm treatments normal, moist, peeled thin, and peeled five times, tubers in the "peeled five times" treatment sprouted much faster than any of the other treatments. There were no significant differences among the other treatments. Freshly harvested material was used.

In table 6 are given the results of this experiment in which there were ten tubers of each variety per treatment with four replications.

To differentiate between the possible reasons why tubers peeled several times sprouted earlier than the tubers in the other treatments, experiments were conducted using tubers which were freshly harvested and those which had completed their rest period. The four periderm treatments used were "normal periderm", "peeled thin", "peeled thick" and "peeled four times". Table 7 gives the results of an experiment using

TABLE 6.—*Average number of tubers sprouting per box using four periderm treatments on four potato varieties at a temperature of 64° F. and a relative humidity of 67 per cent.*

Treatment	Average Number Sprouting
Normal	2.9
Moist	2.9
Peeled thin	3.1
Peeled five times	6.6
L. S. D. at 0.05 level	1.7
L. S. D. at 0.01 level	2.5

TABLE 7.—*Days to sprouting of Sebago tubers out of their rest period with four periderm treatments.*

Treatment	Average Days to Sprouting per Box Total
Normal	63.0
Peeled thin	77.3
Peeled thick	76.3
Peeled four times	88.3
L. S. D. at 0.05 level	8.6
L. S. D. at 0.01 level	15.7

TABLE 8.—*Days to sprouting of freshly harvested Bliss Triumph tubers with four periderm treatments.*

Treatment	Average Days to Sprouting per Box Total
Normal	348
Peeled thin	275
Peeled thick	231
Peeled four times	224
L. S. D. at 0.05 level	40.1
L. S. D. at 0.01 level	60.7

Sebago tubers which had terminated their rest period. The normal periderm tubers sprouted earlier than any of the other treatments. Similar results were obtained using Green Mountain tubers which had completed their rest period. Table 8 gives the results of an experiment using freshly harvested Bliss Triumph tubers with ten tubers per treatment and three replications. Here tubers in the "peeled tick" and "peeled four times" treatments sprouted earliest. Tubers in the "peeled thin" treatment sprouted earlier than the tubers with normal periderm. There were no differences between the "peeled four times" and "peeled thick" treatments.

Discussion and Summary

The results from the controlled atmosphere studies indicate that oxygen may have some influence on the rest period in closed containers at certain temperatures. There was a tendency for tubers in the low oxygen concentrations to sprout earlier than those in high oxygen concentrations. This was more apparent at 50° F than at 64° F; at 85° F there were no differences among oxygen concentrations. The clear-cut results of Thornton (7), (8) could not be duplicated in these experiments using approximately 40 tubers per treatment total in which appropriate check treatments and measurements were made to insure no influence from the metabolic by-products during the breaking of the rest period. Possibly oxygen has an indirect effect on the rest period of tubers in closed containers. Burton (2), (3) states that changes in the oxygen in the storage atmosphere may influence not only the oxygen in the tuber but also the content of carbon dioxide and possibly more important metabolic products.

Results from the diffusion experiments indicate that the wound periderm which forms on injured tubers is more permeable to both oxygen and carbon dioxide than the normal periderm. The results indicate that the periderm of moist stored tubers has a faster rate of diffusion than the periderm of dry stored tubers. These are exactly opposite the results one would expect to find according to Thorntons' (7), (8) oxygen theory.

The results from the peeling experiments seem quite understandable in the light of the work of Hemberg (5), (6). Hemberg found large quantities of a growth inhibiting substance in the peel of freshly harvested tubers. This material could no longer be found in the peel of tubers stored several weeks. Thus, freshly harvested tubers peeled thin could have sprouted earlier than tubers with normal periderm because some of the growth inhibiting substance had been removed in the peel. The tubers in the "peeled several times" and the "peeled thick" treatment could have sprouted earlier than tubers in the "peeled thin" treatment because more inhibitor was removed. There was no difference between the peeled thick and peeled several times treatments because approximately the same amount of growth inhibiting substance was removed by each. The different results obtained with tubers out of their rest period could be explained by the fact that the growth inhibiting mechanism was no longer functioning and the healing process with the peeled potatoes could have held back their sprouting date compared with that of non-peeled tubers.

The results of these three phases of work would suggest that the oxygen-periderm relationship does not affect the normal breaking of the rest period and that oxygen *per se* is not the normal factor regulating the rest period of the potato tuber.

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NEWS AND REVIEWS

INCREASING POTATO USE THROUGH SALES PROMOTION[1]

KRIS P. BEMIS[2]

Presented at the Sixth National Potato Utilization Conference, Cornell University, Ithaca, N. Y., November 17, 1954.

The food industry of the United States spent $160,000,000 for advertising in 1953. This included magazines, newspapers, network radio and network television. It was the largest advertising expenditure of any business group. Next in importance were toiletries and toilet goods, $115,000,000; and automobiles, automobile accessories and equipment, $90,000,000.

For the year beginning last August, reports indicate that the fresh fruit and vegetable industry will be spending about $11,000,000 on advertising and promotion. These figures come from estimates furnished at the Sixth Annual Merchandising and Management Conference of our Association in Chicago last summer. They do not include money spent by retailers. In round figures, those expenditures will be; citrus about $6,000,000; apples, $1,000,000; lettuce, $500,000; cranberries, $500,000; potatoes, $500,000; pears, $400,000; avocados, $200,000; sweet potatoes, $100,000; and bananas, perhaps $2,000,000.

Fresh fruits and vegetables comprise about one-fourth of all food eaten in the United States. On this basis you might expect one-fourth of the total food advertising expenditure, or $40,000,000, to be spent in advertising these products. Although we won't have $40,000,000 to spend, or even one-half that, I'll try and show a little later how sales promotion work is being conducted, at cut-rates, for considerably less.

WHAT ARE FOOD ADVERTISERS COMPETING FOR?

Actually, *per capita* food consumption in this country has changed little in 40 years. It is about 1,580 pounds annually. Once since 1909 that figure has gone up to as high as 1,674 pounds (in 1945) and once as low as 1,494 pounds (in 1934). This is a variation of approximately 11 per cent.

Within the total, however, there have been shifts between commodities. There has been a decline in *per capita* consumption of flour and cereal products. Potatoes and sweet potatoes declined, as you know. Practically unchanged, though with minor variations, was the consumption of meat, fish and poultry. Fats and oils have varied but little. Substantial increases have occurred in the consumption of citrus and tomatoes, as well as leafy green and yellow vegetables. People now eat nearly twice as much of these foods as they did in 1909.

These are *per capita* figures. Total consumption has been helped by the fact that since 1909 our population grew from a little over 90 million to more than 160 million. This gives us about 70 million more food customers.

[1]Accepted for publication December 6, 1954.

[2]Secretary, Potato Division, United Fresh Fruit and Vegetable Association, Washington, D. C.

It seems obvious that a food advertiser strives to get more of his product into the American stomach, even it it is at the expense of somebody else's product. This doesn't mean that fresh fruits and vegetable producers should split up all their efforts among 75 or 100 different commodities. Rather they should consider the advantages, both in expense and results, of combining to promote fresh fruits and vegetables as a group.

Advertising vs. Sales Promotion

Let's consider for a moment the relationship of advertising and sales promotion. I've mentioned that an estimated $11,000,000 will be spent in the coming year on fresh fruits and vegetables; about $500,000 of it on potatoes. This potato money will come from Maine, Idaho, California, the Red River Valley and Colorado. Perhaps a few other areas have programs which should be included, but the total would not be increased materially. This money will be spent, for the most part, for advertising; in trying to induce customers to buy potatoes grown in those states. This will be so because the funds are raised, for the most part, by state taxes in one form or another, and the way they can be spent is generally limited by law to the products of that state. Therefore, the advertiser's interest will be first of all in his own product. The broader, general appeal to eat more of the product will be secondary.

Promotion, on the other hand, has been defined as contributing to the growth, enlargement or prosperity of something in being. It's closely related to public relations, which has been defined as any activity calculated to build the stature of an individual, an institution, or a product.

Sales promotion of fresh fruits and vegetables is a national job. It leaves the relative merits of Maine potatoes, Idaho potatoes or California potatoes to the advertising campaigns in these respective areas. It concentrates on persuading more people to eat potatoes more often.

Sales promotion in our business is most effective when applied to the entire line of fresh fruits and vegetables. That there are sound reasons for this has been conclusively demonstrated in the last ten years. We all know that potatoes are not sold alone, but as part of a retail display. Potatoes derive sales appeal from the entire produce department. Retailers think in terms of the entire department. Restaurant operators and housewives think in terms of the whole meal. Moreover, sales surveys show that one fresh fruit and vegetable item helps sell another. In fact, 71 per cent of food purchases are made on impulse. The reprint from the Department of Agriculture's publication, "Marketing Activities", which you have, emphasizes these facts and gives the Department's viewpoint on the practical results of such promotion.

It's a fact that some of our largest shippers are training their dealer service men in the United Merchandising Institute, which is supported in part by the United States Department of Agriculture. A dealer service man for cranberries needs to know the fundamentals of produce department display. A dealer service man for oranges makes more friends with more retailers when he can give intelligent advice about the whole produce department. When employers spend money for this training, not once but repeatedly, they must think it pays. Wholesalers also are training their merchandising men to promote the sale of all fresh fruits and vegetables in the Department.

How Does the National Promotion Job Get Paid for?

It takes money to run a national sales promotion campaign, but not as much money as a national advertising campaign. The job needs staff, facts, contacts and a system for distributing information. It needs also that intangible something called confidence, which furthers belief in your publicity material and is accepted by food editors. You don't achieve that overnight. So the job needs time for building, and continued financial support.

In states where there are Federal Marketing Orders, a recent Act of Congress makes it possible to raise funds for marketing research and development projects by assessment under those orders. Existing potato orders would have to be amended before such a levy could be made. This procedure is about as lengthy as adopton of the original order. If such an amendment is voted by the producers, and the budget is approved by the Secretary, they must then be persuaded to part with a portion of the money for national promotion.

Another method is by voluntary contributions. This has long proved difficult in the potato industry, sometimes impossible. The United Fresh Fruit and Vegetable Association has succeeded in obtaining support for a plan of voluntary investment on a per car basis. Distributors, receivers and shippers pay 25 cents per car; brokers 5 cents. The promotional plan is set up across the board on all the products we handle. Here are some things accomplished to date.

Fresh-For-Health Foundation

First of all is the work done by our FRESH for HEALTH Foundation, now in its second successful year. So much has happened since this program started that I can give you no more than a sketch of the publicity achieved. You can learn more about it when you read the Monthly Report which has been handed to you.

The FRESH for HEALTH publicity is directed first of all to food editors, dietitians and company home economists. It also gives to T.V., radio, newspaper and magazine food editors throughout the country. Of course restaurant magazines are included. Each month we send a fruit release and a vegetable release and accompanying photos to food editors of leading newspapers. These releases are exclusive to each paper in its territory. The photos are important. They are carefully posed 8x10 glossy prints that will reproduce well. We are also starting a new color photo service that has proved an immediate success. Photos are taken in the test kitchens of our publicity organization and are tailored to order for the publications requesting them. The first use was in 100 newspapers serviced by the Milwaukee Journal Syndicate. The Chicago Tribune ran a two-page spread on beef and vegetables, including potatoes, using two United color photos. The Newark News ran another.

Syndicates

We give special cooperation to syndicates, each serving a large number of papers. I might name the Zola Vincent Syndicate, Dr. Ida Bailey Allen of King Features, the Associated Press, Family Weekly and General Features. We mention particularly that dean of food writers,

Gaynor Maddox of NEA Service, with 25,000,000 circulation in 1,000 newspapers. He promptly wrote a story on the "He-Man Potato Salad" last spring.

Magazine Articles and Special Features

Frequent contact is made with magazine food editors. The results are cumulative. They know now that when they call on our organization for information, or for help in obtaining products for photographing, or for story suggestions, they'll get what they want. We have worked with top magazines, some with huge circulations. A few of them are Life, Parents, Western Family, Good Housekeeping, Farm Journal, Family restaurant magazines, Today's Woman, House Beautiful and even True Confessions. Special articles have also been placed in the New York World Telegram and Sun, Washington Star, New York Post, New York Daily News and New York Journal-American .

In telling you this I am perhaps violating a principle we have learned; that we have to be careful in working with magazines never to publish a statement about what we have done for them that will annoy the editors. So we are purposely vague at times in reporting this kind of work. Nevertheless, you may be sure that we are doing a great deal of work with and for magazines and their editors like us.

I must include special feature articles for restaurant magazines prepared by our Staff Food Economist, Barbara Ann Cooke. Last month more than 18 restaurant magazines with an estimated readership of 60,000 restaurant operators received her story, "Ways with Potatoes." Her recipes are for institutional use and are planned for a large number of servings.

Coverage

In the first year alone, up to last June, a conservative estimate shows that a total circulation of more than one billion two hundred million had been reached. This was through newspaper releases, newspaper syndicates, magazines, television and radio. We had distributed fully 25,000 copies of 480 specially developed recipes, 6,000 copies of 80 specially prepared photos and 24,000 copies of 40 releases. There had been an average of one publicity feature on potatoes per week since the program began.

Tie-In Publicity

An importnat publicity feature is the tie-in with other industries. I think you all know about the beef stew promotion last month. Here we tied up with the American Meat Institute and the Western States Meat Packers Association to publicize beef stew, which contains lots of potatoes when properly made. The meat industry supplemented our releases with a flood of their own. They provided more than 100,000 full color banners and display pieces for which we furnished a much needed distribution system to wholesalers and retailers through the United Merchandising Institute.

Early last summer paid advertisements by the Wesson Oil people featured French fried potatoes. To name just two others, the American Spice Trade Association and the National Association of Margarine Manufacturers feature potatoes and other vegetables in their food releases. This is a legitimate free ride which costs our industry nothing.

Mats and Cartoons

Mats are released regularly to 1,500 grassroots dailies and leading country weeklies. We already have clippings to show the use of the mat service by 61 papers with circulation of less than 25,000 each. In the aggregate such papers reach millions.

You've probably seen the cartoon type of picture under the heading "Here's Health—by Lewis". One of these is reproduced in the copy of the Monthly Report which you have. There have been several exclusives "Here's Health" cartoons on potatoes.

Radio-TV

There isn't time to tell you all of the publicity that has gone out for radio and television use. Most of the food editor-release material is rewritten in another form for radio presentation. The list of television shows in the FRESH for HEALTH program so far includes major stations in New York City, Oklahoma City, New Haven, Newark, Baltimore, Pittsburgh, Chicago, and Boston. That alone is big coverage for fruits and vegetables—and potatoes. Every month we add to the list.

The Nutrition Field

One of our biggest selling features is the value of our products in the diet. Before the FRESH for HEALTH Foundation was started, we knew we would have to appeal directly to four groups. They are as follows:

The 300,000 doctors and dentists, in order to be helpful to them in their attempt to keep Americans healthy.

The nation's school teachers, to help them in their work to give the health story of proper nutrition to our 30 million school children.

25,000,000 overweight people who should be interested in learning how to live longer and happier by following right dietary habits.

The great American public,, so that they may know good living at its tasty and flavorful best.

We are reaching the first group, the doctors and dentists, through the Council on Foods and Nutrition of the American Medical Association. Its Secretary, Dr. James R. Wilson, has discussed the subject in many articles and meetings. He has also written an address on the subject from a physician's viewpoint, which is widely circulated and accepted. You have seen the story written by Mrs. Wilson, "How to Eat a Potato—and Why".

We are reaching the school children in many ways. One of them is the teaching aid, "Health from Field and Orchard," prepared nearly three years ago. More than 600,000 copies of it have gone into the intermediate and upper grades for classroom instruction.

A more recent teaching unit for primary grades is a twelve-page booklet of drawings entitled "Jane and Jimmie Learn about Fresh Fruits and Vegetables". The drawings are especially designed for coloring in crayon or water coloring by the children. When the coloring is completed the pages make up into a book to be taken home to the parents. There's one full page on potatoes and they are also shown on other pages. The demand has been so heavy that all the 140,000 books had been spoken for

by the teachers before they came off the press. A plan for the printing of additional copies is under way.

The 25 million overweight people are being reached in part through doctors and dieticians. FRESH for HEALTH was represented in an exhibit at the American Dietetic Association Convention in Philadelphia recently. More than 1,300 dietitians, nutritionists and home economists signed requests for literature and film strips on fresh fruits and vegetables including potatoes. They were given copies of a specially prepared booklet entitled "Fruit and Vegetable Facts and Pointers on Nutrition".

And of course the great American public is being reached by all the programs I have outlined.

General Program

The work of the FRESH for HEALTH Foundation expands and intensifies the general work in publicity we have long been doing. The list of regular and special publications we issue on different phases of the fresh fruit and vegetable business totals more than 30. It includes the Fruit and Vegetable Facts and Pointers, which are Fact Sheets totaling 290 pages dealing with each of 76 fresh fruits and vegetables. This compiled information has never before been available in this form.

Food buyers, particularly in the restaurant business, value our Monthly Supply Letter containing information about supplies and price trends of 50 or more fresh fruits and vegetables for the coming month. They like the Produce Supply Guide, a 4-page chart showing the average monthly availability of each of 102 fresh fruit and vegetable items. It is expressed as a percentage, each month, of the total annual supply.

Ad writers particularly appreciate the 36-page booklet on Selling Words and Phrases for Fresh Fruits and Vegetables. Approximately 6,800 selling words and descriptive phrases covering 87 commodities are arranged alphabetically. The descriptions correctly fit the various varieties. It has been so popular that a second printing had to be ordered.

Special Potato Publicity

All of you are familiar with the special potato publicity the United has been responsible for. Our truckside poster this month, No. 84 in the series, means that for 84 consecutive months these posters have been issued. Plans are now under way for the annual potato poster which will appear next month.

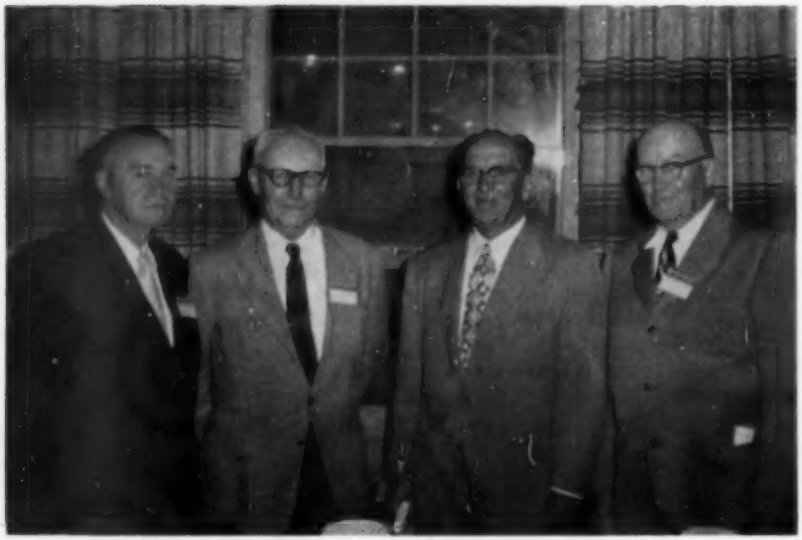
You know about Potato Sack-Fax, created by our Potato Division and used widely from coast to coast. Bag manufacturers have cooperated in reproducing these potato-selling slogans on consumer-size packages. More than 70 million potato packages have been imprinted with them. One of the major bag companies is now using more than 30 of them as a printing overlay on a 10-pound polyethylene bag.

We have helped with special potato cooking demonstrations conducted by the National Restaurant Association. Potatoes will be prominently displayed and used at a Regional Restaurant Exposition in Washington later this month. We think the restaurant people as a group are one of our most valuable contacts with the public.

How Far Can Sales Promotion Go?

This has been at best only a bird's-eye view of a public relations program that is already established. It needs only additional funds to make it much bigger. The groundwork has been laid, contacts have been made, and the methods have been tested. There can be more potato posters, more widely distributed, and issued more often. The work with the public schools can be expanded far beyond anything yet accomplished. There can be more radio programs and TV shows and newspaper and magazine stories. The friendly cooperation of the public feeding industry can be expanded indefinitely. We can be represented at meetings and conventions of many more cooperating groups; we can tell them the facts about better nutrition, better health and longer life through greater consumption of our products, including potatoes.

The program can expand as fast and go as far as this business wants it to go. It needs only the increased and continued financial backing of the produce industry.



The Potato Association of America honored four scientists for outstanding contributions to the potato industry, at its Annual Meeting held August 27, 28, 29 at Estes Park,Colorado. Three of the four given Honorary Life Memberships in the Association are shown above with retiring president J. W. Scannell, at the left. Others, in order, are A. J. Tolaas, H. O. Werner and Donald Folsom. Henry Moore was not able to be present.

A. G. TOLAAS HONORED

A. G. Tolaas was born in St. Paul, Minnesota, February 22, 1888. He graduated from the College of Agriculture of the University of Minnesota in 1911, and was granted the M.Sc. degree in plant pathology in 1912. From 1912 to 1915 he was assistant in plant pathology at Minnesota, was extension plant pathologist with the Minnesota Agricultural Experiment Station from 1915 to 1919, and in 1919 assumed charge of potato certification in Minnesota, a position he has held, with distinction, ever since.

During his early days in plant pathology and later as extension plant pathologist. Mr. Tolaas participated and assumed leadership in experiments to control "running out" in potatoes, a condition now known to be caused, principally, by virus diseases. Although the causes of these diseases were not then known, the fact of seed transmission was recognized. To test the efficacy of tuber-unit planting as a method of maintaining disease-free stock, Mr Tolaas and others established a series of experimental demonstation plots with farmers. These were phenomenally successful in showing that disease-free seed produced higher yields than field-run seed. Experiments were also conducted during this period on sprays, seed

treatment, and other methods of controlling potato diseases, and Mr. Tolaas was co-author of several station bulletins describing experimental results and making the information available to potato growers.

When the Minnesota legislature passed the potato certification law in 1919, Mr. Tolaas helped draft it in its original form, and as changing conditions have made changes and revisions necessary, his wisdom and experience have guided the lawmakers. The establishment of potato certification in 1919, with Tolaas in charge made Minnesota the second state to adopt officially this means of disease control, although through the efforts of Mr. Tolaas and others in the Division of Plant Pathology, the methods basic to producing certified seed had been practiced for several years before.

Mr. Tolaas took over the job of certifying potatoes in Minnesota with a background of scientific experience from his work with potato diseases, and of experience in working with farmers from his tenure as one of the first extension specialists in plant pathology in the United States. He also gained the confidence of many potato growers in the state by the success of the seed plots and other experiments started several years before.

During the past 35 years this training, experience, and good will have helped him to make the state of Minnesota one of the leading producers of certified potato seed. As new facts were discovered he skillfully applied them to practical situations; as the soundness of his knowledge and judgment became more apparent, the confidence of the potato growers increased and the growers, through his teachings, became one of the best-informed groups of farmers in the state. To them as to his scientific colleagues he stands at the top as an authority on potato disease control, and as a leader in teaching people how to apply science to their own problems.—*Carl J. Eide*

H. O. WERNER HONORED

When our President, Mr. J. W. Scannell, asked me to present my old friend and professor, Dr. H. O. Werner, as a candidate for honorary membership, I was very pleased. This gave me an opportunity to partially repay many of the personal favors which I have obtained from him for a long period of time. I was also glad to act as spokesman for the many Nebraska people with whom he has worked for more than 35 years. I am sure many of them are envious of my position.

Harvey Oscar Werner was born on October 31, 1893, at Wernersville, Pennsylvania. The town, incidentally, was named after his grandfather. His college career began with a B.Sc. degree from Pennsylvania State University, at State College, Pennsylvania, in 1913. In 1923 he obtained his M.Sc. degree at the University of Nebraska, and nine years later, his doctorate at the University of Chicago.

His first position after completing under-graduate work, was at North Dakota Agricultural College, Fargo, in 1913. He remained at this post until October, 1918, when he came to the Agricultural College of the University of Nebraska, at Lincoln, where he has remained ever since. At present he is Professor of Horticulture.

Dr. Werner's activities covered a wide field. Although most people think of him as a potato specialist only, he has conducted considerable work in the vegetable field, connected with tomato breeding and cultural tests on sweet potatoes. He has also served in extension, teaching, and research in the field of horticulture.

Dr. Werner's chief line of activity, of course, has been connected with potatoes. Because of the wide extent of his activities, I can only enumerate them without elaborating. These cover many phases of, or relating, to potatoes. He has conducted numerous cultural experiments; in collaboration with Dr. R. W. Goss, a number of disease trials were conducted, one of which resulted in the discovery of the Spindle Tuber disease; his tuber and plant studies are very extensive; potato storage experiments were conducted in collaboration with A. D. Edgar, of the U.S.D.A. and are still in progress; potato breeding, which has been his chief activity for the past 15 years, is at present among the most extensive at any Experiment Station in the United States.

The early work of seed improvement in certification in Nebraska was handled in the Horticultural Department, under his direction. His experiments and tests laid the ground work for the potato certification program, which is still in progress in Nebraska. In connection with seed improvement and certification, he acted as secretary of the Nebraska Potato Improvement Association for 24 years.

There are many tangible results of his activities, not only in Nebraska, but in the National potato field as well. My own file is not complete. However, I have a list of more than 100 technical and other bulletins which he has published. These do not include the many papers written for popular release in newspapers and other miscellaneous publications. He still has a prodigious amount of material available, which is unpublished.

In my opinion, one of his outstanding fields of activity has been his development and encouragement of students and co-workers. Many individuals who worked with him are now in responsible positions in other institutions and in commercial fields. It is readily apparent why he is known as "The father of the potato industry" in our state.

Even though I have spoken of his activities in his chosen field of work, another field should not be overlooked. This is his personal and family life. He, and his able partner and wife, whom we are also honoring today, had a fine family of two boys and two girls, all of whom are successfully established in fields of their own.

Through the years, a number of honors have come to Dr. Werner, although I am sure they have not been adequate to compensate for his many activities. About ten years ago, at their annual meeting, the officers of the Nebraska Certified Potato Growers Non-Stock Co-Operative honored Dr. Werner for 25 years of service, and presented him with a gold watch. Two years ago the officers of the Potato Certification Association of Nebraska presented Dr. Werner with an honorary membership in their Association, for more than 30 years of potato improvement work. Other honors have come his way, which I am unable to present at this time.

Again, I am very grateful for the opportunity of presenting my good friend, Dr. H. O. Werner, as a candidate for honorary membership in the Potato Association of America.—*Marx Koehnke*

DONALD FOLSOM HONORED

It is with a great deal of pleasure and pride that I present to you Dr. Donald Folsom, a true potato scientist. Dr. Folsom was born in Iowa in 1891 and later moved to Nebraska. His undergraduate work was done at the University of Nebraska where he majored in Botany. For his M.A. and Ph.D. he studied at the University of Minnesota.

After receiving his Doctorate degree he taught Botany and Plant Physiology at North Carolina State College. In 1918, Dr. Folsom came to the Maine Agricultural Experiment Station where he was destined to find a home and spend a lifetime of productive work with potatoes. Under the helpful guidance of Dr. W. J. Morse, Dr. H. A. Edson, and Dr. E. S. Schultz he conducted or partook in research on a long list of potato problems. Some of these problems were: differentiation of kinds of mosaics, transmission and spread of mosaic, leafroll, and spindle tuber; effect of leafroll on net necrosis; methods of control of virus diseases; differentiation of stem-end browning from net necrosis; causes of early blight rot, botrytis rot, and mahogany browning, and many others. A bibliography of his work contains approximately 114 items.

For many years he has been Head of the Department of Plant Pathology at the University of Maine in addition to being a member of the staff of the Maine Agricultural Experiment Station.

Dr. Folsom has always been a man to whom we, in Certified Seed work, looked for advice, help and counsel. Many of the pressing problems which have confronted us in this work have been solved by his careful research work. In the records of seed improvement work in Maine, Dr. Folsom's name appears many times as one who has given advice, conducted research work, and in general, given a helping hand.

Outstanding in his list of accomplishments is his work on virus leaf roll and net necrosis of potatoes.

His early work on leaf roll resulted in the development of control practices which are common knowledge to nearly all seed growers and many table stock growers today. Such practices as, early harvesting of seed plots, tuber unit planting, and winter testing in southern areas, have been among the practices advocated by Dr. Folsom. They are as basically sound and effective today as they were years ago.

For the past several years Dr. Folsom, among other things, has been working on the wilt disease, *Verticillium albo-atrum*. Results of this work already indicate that under Maine conditions, crop rotation is an important step in the control of this disease.

We, in Maine who are connected with the potato industry know the value of Dr. Folsom's many contributions to the science of potato production and are very happy to have Doctor Folsom receive his national honor from the Potato Association of America.

—*Paul Eastman*

HENRY CARLTON MOORE HONORED

Henry Carlton Moore entered Cornell University in 1909 after attending Western Maryland College but left for a few years to do outside work.

He reentered Cornell in 1912 and received his degree from there in 1915. After spending two years in landscape work in Illinois and Minnesota he came to Michigan in 1917 but soon entered the military service. He was an officer in the Field Artillery until the end of World War I after which he joined the staff of the Horticultural Department of Michigan State College.

It was under his direction that the first certified seed potato program was started in Michigan and this has since been his favorite project. He assisted Dr. William Stuart with the earliest work on certification and standardization of varieties.

While serving as secretary-treasurer of the Potato Association of America for 8 years he also edited the American Potato Journal and the Proceedings of the Association.

Mr. Moore collaborated with Federal plant breeding work and sponsored the Foundation Seed Program. He also organized the first "300 Bushel" club and published numerous bulletins, technical papers and text books along the lines of potato improvement.

One of his highest honors was his election to the presidency of the Potato Association of America in 1927.

Aside from his contribution to the technical and educational aspects of potato culture, he has found time to maintain personal contacts with growers and distributors throughout the entire United States and Canada.

—Prepared by Harry Reiley, presented by Cecil Frutchey

USDA REPORTS NEW TYPE OF DEHYDRATED MASHED POTATOES

The pilot-plant development of a new kind of dehydrated mashed potatoes with unusual properties was reported by a team of U. S. Department of Agriculture research scientists at the Sixth National Potato Utilization Conference at Ithaca, N. Y.

Called "potato flakes" by the researchers, the new product can be rapidly converted to mashed potatoes by addition of either water or milk. An important advantage of potato flakes is that the temperature of the water or milk can vary over a wide range.

After whipping, the product has the texture and color of good freshly mashed potatoes. The flavor is delicious and somewhat that of baked potato.

The potato flakes are made by drying cooked mashed potatoes on the rolls of a steam-heated double-drum drier.

Commercial development must await completion of storage tests and cost estimates, the scientists reported. They added that the process should be economical because the drying equipment is widely available, little labor is required and steam is used efficiently.

The process and product are described in detail in the Department's Agricultural Research Service Circular ARS-73-2, "Potato Flakes. A New Form of Dehydrated Mashed Potatoes. I. Pilot-Plant Process Using Double Drum Drier," by James Cording, Jr., Miles J. Willard, Jr., Roderick K. Eskew and Paul W. Edwards. A free copy may be obtained from the Eastern Utilization Research Branch, Agricultural Research Service, U. S. Department of Agriculture, Philadelphia 18, Pa., or from Agricultural Research Service, USDA, Washington 25, D. C.

POTATO ASSOCIATION OF AMERICA

Executive Committee Meeting

Potato Certification Service Office, Fort Collins, Colorado

August 24, 1954

10:00 A.M.

Meeting called to order by President Scannell.

Members Present:

J. C. Campbell, J. W. Scannell, A. Hawkins, N. M. Parks, R. W. Hougas, P. J. Eastman, C. W. Frutchey.

Visitors: R. V. Akeley, G. H. Rieman and Marx Koehnke

Members Absent: Wm. H. Martin

The minutes of the Executive Committee Meeting of 1953 at Madison, Wisconsin were read and accepted.

Advertising:

There was considerable discussion of the advertising situation in the Journal.

From 11:00 A.M. to 12:15 Noon, Mr. C. S. Macfarland, The Advertising Agent for the Journal, met with the Committee to further discuss the problems of advertising in the Journal. The relationship of the advertising in the American Potato Yearbook and in the American Potato Journal was discussed.

Motion:

It was moved by J. C. Campbell that C. S. Macfarland, Jr. be requested to draw up a proposition:

(1) Whereby he will be willing to sell the American Potato Yearbook to the Potato Association of America and be retained as advertising agent for both the American Potato Journal and the American Potato Yearbook. (The advertising rate for this proposition is requested.)

(2) A proposition whereby he will be willing to sell the American Potato Yearbook outright to the Potato Association of America with no obligations to C. S. Macfarland, Jr.

It is understood, under either proposition, that C. S. Macfarland will not publish a competing publication.

Seconded by N. M. Parks. Motion carried.

Above Motion made in the presence of Mr. Macfarland.

Meeting recessed at 12:15 Noon.

Meeting resumed at 1:45 P.M.

It was moved by C. W. Frutchey that as soon as the President has a reply from Macfarland, providing:

A. The figure asked for the Yearbook under proposition #1 is more than $1,000, then Mr. Macfarland be dismissed, with 90 days notice, as advertising agent of the American Potato Journal and action be taken to obtain a new advertising agent.

B. If the figure asked for the Yearbook is *not more* than $1,000, that the President and Treasurer be authorized to arrange the advertising rates for *both* the American Potato *Journal* and the American Potato *Yearbook*.

Seconded by P. J. Eastman. Motion carried.

Publication of a Special Issue:

Motion:

It was moved by C. W. Frutchey that if the Yearbook is not purchased, a special issue of the Journal be published recommending the use of certified seed throughout the nation and that the certified seed industry be encouraged to advertise in this issue. Further, that gratis distribution of this special issue be made, as widely as possible, to the growers and others of the industry.

Seconded by P. J. Eastman. Motion carried.

Session adjourned at 3:30 P.M.

Executive Committee Meeting
YMCA Camp, Estes Park, Colorado, August 26, 1954
Employees Dining Room

9:00 P.M.
Members Present:
J. W. Scannell, C. W. Frutchey, A. Hawkins, J. C. Campbell, R. W. Hougas, N. M. Parks, P. J. Eastman
Absent: Wm. H. Martin
Affiliation with A.I.B.S.:
Moved by J. C. Campbell that the Potato Association of America continue to affiliate with A.I.B.S. provided the annual rate is the usual $100.
Seconded by A. Hawkins. Motion carried.
Change in Fiscal Year:
Motion:
It was moved by J. C. Campbell that the By-law (7A) in the Constitution be amended to read that the fiscal year of the Association shall be from August 1 through the following July 31 : This change to be effective with the 1955-56 fiscal year. The 1954-55 fiscal year will comprise the eight month period December 1, 1954 through July 31, 1955.
Editorial Board
Motion:
It was moved by Arthur Hawkins that:
A. An Editorial Board consisting of three members: 1. A Technical representative, 2. A News and Reviews representative, 3. A Supplement representative, be appointed by the President.
B. That the President appoint a Publication Committee to consider the form of the Journal format.
Seconded by P. J. Eastman. Motion carried.
Travel Funds
Motion:
It was moved by C. W. Frutchey that the regular officers of the Executive Committee be allowed up to $50.00 for expenses in attending the annual meeting if they were unable to obtain expenses elsewhere; these funds to be allocated at the discretion of the Executive Committee.
Seconded by N. M. Parks. Motion carried.
J. C. Campbell discussed the need for a typewriter and filing case for his duties as treasurer and associate editor. The members of the Executive Committee authorized Mr. Campbell to proceed with the purchase of these two items.
Session adjourned at 11:00 P.M.

Executive Committee Meeting
YMCA Camp, Estes Park, Colorado, August 27, 1954
Colorado Room

1:00 P.M.
Members Present:
J. W. Scannell, C. W. Frutchey, P. J. Eastman, A. Hawkins, R. W. Hougas
Visitor: Marx Koehnke
Members Absent: N. M. Parks, J. C. Campbell, Wm. H. Martin
Managing Editor's Salary
Motion:
It was moved by C. W. Frutchey that the managing editor's salary be increased from $440 to $800 per year (with an additional $400 if the managing editor edits the Supplement or Yearbook; this change to take place September 1, 1954.
Seconded by P. J. Eastman. Motion carried.
Session adjourned at 1:30 P.M.

POTATO ASSOCIATION OF AMERICA
Annual Meeting, Colorado Room, YMCA Camp, Estes Park, Colorado, August 27, 1954

9:00 A.M.
Meeting called to order by President J. W. Scannell.

The Secretary's Report was presented by R. W. Hougas, Report accepted.

The Treasurer's Report was presented by J. C. Campbell, Report accepted. Copy attached.

Motion: It was moved by Marx Koehnke that a certified public accountant be hired to audit the financial records of the Association.

Seconded by W. C. Sparks. Motion carried.

J. G. McLean, on behalf of the Auditing Committee, complimented the Treasurer and the Association on the fine state of the financial affairs.

The Editor's Report was presented by J. C. Campbell, Report accepted.

The President called for a report of the Membership Committee. No report submitted.

J. C. Campbell stated that a detailed listing of the membership of the Association had been prepared. (Note: Copy of this listing now included in Secretary's records and extra copies are available.)

The report of the Sustaining Membership Committee was presented by Arthur Hawkins. Report accepted.

The Minutes of the Executive Committee Meetings were read by the Secretary. Marx Koehnke moved acceptance of the Minutes. Seconded by W. C. Sparks, Minutes approved as read.

J. C. Campbell requested that the Association consider obtaining a new editor within the next year or two.

No reports were presented by the following committees:

Certification Committee
Late Blight Committee
Introduction Committee
Virus Committee

C. W. Frutchey presented the Report of the Policy Committee. Report accepted.

The Nominations Committee Report was presented by A. J. Tolaas.

Nominations:

President ..... Arthur Hawkins
Vice President ..... C. W. Frutchey
Director (3 years) ..... W. G. Hoyman

J. C. Campbell moved that nominations be closed and that a unanimous ballot be cast for the slate.

Seconded by J. G. McLean. Motion carried.

G. H. Rieman nominated Mrs. J. B. Adams to fill the unexpired (1 year) directorship vacated by C. W. Frutchey.

J. C. Campbell moved nominations be closed and that a unanimous ballot be cast for Mrs. Adams.

Seconded by G. H. Rieman. Motion carried.

P. J. Eastman presented the Report of the Resolutions Committee. The Association expressed appreciation to:

C. W. Frutchey
L. A. Schaal
Marjorie Diener
C. W. McAnelly
A. M. Binkley
Marx Koehnke
George Stachwick

for arranging the accommodations and details concerned with the annual meeting. Report accepted with a rising vote of thanks.

Motion: It was moved by G. H. Rieman that Mrs. Marjorie Diener be given $15.00 for her services in conjunction with the annual meeting arrangements.

Seconded by H. O. Werner. Motion carried.

Motion: It was moved by J. C. Campbell that a letter of appreciation be written to Mrs. C. W. Frutchey for her assistance in arrangements for the annual meeting.

Seconded by P. J. Eastman. Motion Carried.

Motion: It was moved by G. W. Hoyman that the Potato Association of America meet with A.I.B.S. at East Lansing, Michigan in 1955.

Seconded by A. J. Tolaas. Motion carried.

Meeting adjourned.

R. W. Hougas,
Secretary.

THE POTATO ASSOCIATION OF AMERICA
STATEMENT FOR THE YEAR ENDING NOVEMBER 30, 1954

RECEIPTS

Cash on Hand and In Bank—November 30, 1953	$ 2,954.48	
Annual Dues	5,976.54	
Sale of Advertising	2,318.67	
Sale of Back Issues	200.77	
Sale of Reprints	2,036.50	
Sale of Index	171.00	
TOTAL RECEIPTS		$13,657.96

DISBURSEMENTS

Printing of Journal	5,477.56	
Printing of Reprints	742.08	
Mailing and Supplies	693.85	
Dues (A.I.B.S.)	100.00	
Traveling & Expenses	129.82	
Advertising	30.00	
Annual Meeting Expenses	50.00	
Back Issues	99.75	
Certificates for Honorary Members	53.25	
Miscellaneous Expenses	87.42	
Salaries — E. Campbell (To Treas.'s Secy.)	660.00	
Salaries — J. Campbell (Editorial)	290.00	
Salaries — E. Clark (Editorial)	240.00	
TOTAL DISBURSEMENTS		8,653.73
CASH ON HAND AND IN BANK — NOVEMBER 30, 1954		$ 5,004.23
Annual Receipts for Year Ending Nov. 30, 1954	10,703.48	
Less: Disbursements Year Ending Nov. 30, 1954	8,653.73	
Net Income for Year Ending November 30, 1954		2,049.75
Add: Cash on Hand and In Bank — Nov. 30, 1953		2,954.48
Balance of Cash on Hand and In Bank — November 30, 1954		$ 5,004.23

LELAH STARKS FUND

Balance on hand November 30, 1953	$ 542.08
Disbursements for reprints	22.00
Balance on hand November 30, 1954	$ 520.08

This balance included in above balances.

Audit made and statement prepared by:
MORRIS B. LAND'S COMPANY
CERTIFIED PUBLIC ACCOUNTANT
61-63 SCHUREMAN STREET
NEW BRUNSWICK, N. J.

USDA ANNOUNCES ASSISTANCE NOT NEEDED FOR REMAINING 1954 LATE CROP POTATOES

The U. S. Department of Agriculture in response to recent requests for a starch diversion program or other assistance in disposing of the balance of the 1954 late potato crop stated that careful appraisal of current and prospective market conditions points to a favorable outlook for remaining supplies of good-quality potatoes.

Potato prices have shown improvement in all late crop producing areas during the past two weeks, Department officials stated. Moreover, since the January 1 merchantable potato stocks report was issued the middle of last week, confidence in the potato market on the part of both buyers and sellers is reported to be generally established. Reduction of January 1 stocks by 10 million bushels below last year and a more favorable geographic distribution are the primary causes for this confidence. An orderly reduction in existing supplies, coupled with quality marketing, should make for improved marketing conditions. Meanwhile, marketing agreement programs are operating in most major late potato poducing areas under which only the better-quality potatoes are placed on the commercial market. In view of these considerations, the Department indicated current marketing conditions do not warrant the inauguration of a potato assistance program.

It was pointed out that market developments would be kept under continuing review as the season progresses. *The Department announced that it will report merchantable potato stocks as of February 1 and March 1 this year.* These reports will become available February 15 and March 17, respectively, and will be compiled in the interest of helping the potato industry to do a more effective job of marketing.

INTENTIONS TO PLANT 1955-ACREAGE

The USDA Intentions to Plant report for the early and late spring states indicates an increase of 14 per cent. Most of this increase is to take place in California which has indicated an increase of 13,000 acres from 57,000 to 70,000. Alabama has indicated an increase of 4,300 acres.

Based on past relationships between intended acreages reported and acreage actually planted, growers in the late and intermediate States are expected to plant 1,138,500 acres — 4 per cent less than the 1,183,500 acres planted in 1954. Decreases are indicated for all groups of States, viz., *eastern late*, down 5 per cent; *central late*, down 5 per cent; *western late*, down 2 per cent; and *intermediate*, down 1 per cent.

USDA acreage guides for early spring and summer potatoes suggest no change in acreage for these areas and suggest a reduction of 5.5 per cent for the late crop.

Reductions specifically suggested are for Maine, 15 per cent; Minnesota and North Dakota, 10 per cent; Connecticut, South Dakota, Idaho, Colorado, Utah, Nevada, Washington, Oregon and California-late area, 5 per cent. No change is suggested in the other States.

WANTED

We are in need of certain volumes of the American Potato Journal. If you are not using your old Journals why not sell them? We will pay the prices noted below for the issues listed. Look through your Journals and send any of the desired copies to John C. Campbell, Treasurer, Potato Association of America, New Brunswick, N. J. Prompt payment will follow.

Volume 1, Nos. 1 and 2 @ 50¢; others @ 75¢.
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Volume 3, Nos. 3 and 7 @ 50¢; others @ 75¢.
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Volume 6, Nos. 5, 7 and 11 @ 50¢; Nos. 4, 6 and 10 @ 75¢; complete $5.
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FOR SALE

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Volume 4, Nos. 2, 6, 8, 11 and 12 @ 75¢, others @ $1.25.

Volume 5, Nos. 1 and 8 @ 75¢; Nos. 4, 9, 10, 12 @ $1.25.

Volume 6, Nos. 4, 6 and 10 @ $1.25; others, 75¢.

Volume 7, Nos. 2, 4, 8 and 9 @ $1.25.

Volume 8, Nos. 1, 3, 8, 9 and 11 @ 75¢; Nos. 10 and 12, $1.25.

Volume 9, All Nos. @ 75¢; complete volume $8.00.

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Volume 11, No. 2 @ $1.25; others @ 50¢; complete volume $5.00.

Volume 12, No. 2 @ $1.25; others @ 50¢; complete volume $5.00.

Volume 13, No. 1 @ 75¢; others @ 50¢; complete volume $5.00.

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Volumes 28-31, All Nos. @ 35¢; complete volumes $4.00.

Proceedings of Annual Meetings

Proceedings of the first 18 annual meetings of the Potato Association of America with the exception of the 5th, 6th and 7th meetings were published and are available at $2.00 each. We have no copies of the second proceedings and a limited supply of the others.

These proceedings contain all of the papers that were presented at the various annual meetings some of which are of great interest.

An Index of the 26 volumes of the American Potato Journal is still available at $3.00 a copy.

All of the above items may be secured from John C. Campbell, Treasurer, Potato Association of America, Rutgers University, New Brunswick, New Jersey.